

Application No. 10/824,719
Technology Center 1795
Submission Accompanying RCE dated March 21, 2008

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A system for storing and retrieving elemental hydrogen, said system comprising:

a housing;

at least one passage connected to said housing for conducting hydrogen gas into and conducting hydrogen gas out of said housing;
-comprising-

a hydrogen storage member enclosed within said housing, said hydrogen storage member comprising a mass -comprising a block- of porous silicon having interior and exterior surfaces, at least said interior surfaces having dangling bond sites at which reversible chemisorption of hydrogen atoms occurs; and -adapted to adsorb and store hydrogen-

a control system for liberating said chemisorbed hydrogen atoms from said dangling bond sites and releasing said liberated hydrogen atoms as hydrogen gas from said housing through said at least one passage.

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Claim 2 (Currently amended): A system in accordance with claim 1 wherein at least said -the said- interior surfaces of said porous silicon have dendritic spikes or etched pits.

Claim 3 (Currently amended): A system in accordance with claim 1 wherein said at least interior surfaces are bare silicon surfaces at which said dangling bond sites are exposed. further comprising: a) a housing for enclosing said hydrogen storage member; and, b) a control system for regulating storage of hydrogen into and retrieval of hydrogen from said storage member.

Claim 4 (Original): A system in accordance with claim 1 comprising a plurality of said hydrogen storage members.

Claim 5 (Previously presented): A system in accordance with claim 1 wherein said porous silicon defines a surface layer over at least a first surface portion of said hydrogen storage member.

Claim 6 (Original): A system in accordance with claim 5 wherein the

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percent void volume of said surface layer is about 50%.

Claim 7 (Previously presented): A system in accordance with claim 5 further comprising electronic integrated circuits on a second surface portion of said hydrogen storage member.

Claim 8 (Currently amended): A system for storing and retrieving elemental hydrogen, said system comprising:

a housing;

at least one passage connected to said housing for conducting hydrogen gas into and conducting hydrogen gas out of said housing;

a hydrogen storage member comprising a porous mesh of silicon columns having surfaces with dangling bond sites at which reversible chemisorption of hydrogen atoms occurs; and adapted to adsorb and store hydrogen; and

means for liberating said chemisorbed hydrogen atoms from said dangling bond sites and releasing said liberated hydrogen atoms as hydrogen gas from said housing through said at least one passage, releasing stored hydrogen from said silicon columns.

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Claim 9 (Previously presented): A system in accordance with claim 8 wherein said silicon columns have an aspect ratio of length to diameter of at least 10.

Claim 10 (Previously presented): A system in accordance with claim 8 wherein said silicon columns are formed by extrusion of molten silicon to have surfaces on the (111) plane.

Claim 11 (Previously presented): A system in accordance with claim 10 wherein said silicon columns are extruded through at least one aperture that is an integral multiple of the lattice spacing of silicon such that said silicon columns have a minimum energy configuration suitable for forming a crystal.

Claim 12 (Previously presented): A system in accordance with claim 8 wherein said silicon columns have diameters of about 1 nm.

Claim 13 (Previously presented): A system in accordance with claim 12 wherein said silicon columns have cross-sectional shapes selected

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from the group consisting of triangle, rhombus, square, and circle.

Claim 14 (Previously presented): A system in accordance with claim 10 wherein said silicon columns have roughened surfaces.

Claim 15 (Currently amended): A system in accordance with claim 1 further comprising releasing means controlled by said control system for causing said chemisorbed hydrogen atoms to be liberated from said dangling bond sites, for releasing said stored hydrogen from said member.

Claim 16 (Previously presented): A system in accordance with claim 15 wherein said releasing means is selected from the group consisting of light sources, current sources, voltage sources, and combinations thereof.

Claim 17 (Previously presented): A system in accordance with claim 15 wherein said releasing means comprises a light-emitting diode.

Claim 18 (Previously presented): A system in accordance with claim 15 wherein said releasing means comprises a light source that emits

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photon energy at a wavelength of about 660 nanometers.

Claim 19 (Previously presented): A system in accordance with claim 1 wherein said porous silicon is in a monocrystalline form.

Claim 20 (Previously presented): A system in accordance with claim 19 wherein said porous silicon is a silicon wafer.

Claim 21 (Previously presented): A system in accordance with claim 1 wherein said porous silicon is in a polycrystalline form.

Claim 22 (Previously presented): A system in accordance with claim 1 wherein said porous silicon has been treated by a process selected from the group consisting of crushing, milling, treatment with hydrofluoric acid and methanol in the presence of electric current, treatment with potassium hydroxide, treatment with hydrazine, wet etching, dry etching, electrodeposition of a noble metal such as palladium or platinum, conformal vapor deposition of silicon, and non-conformal vapor deposition of silicon.

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Claim 23 (Previously presented): A system in accordance with claim 1 wherein said porous silicon is derived from molten silicon by crystallization.

Claim 24 (Previously presented): A system in accordance with claim 1 wherein said porous silicon is derived from silicon waste obtained from a silicon process waste stream.

Claims 25-37 (Canceled)